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(54) **SYSTEM AND METHOD FOR DETERMINING THE LOCATION OF WIRELESS SENSORS**

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H04W 4/02	(2009.01)
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G01S 5/02	(2010.01)
G01S 5/12	(2006.01)
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H04W 64/00	(2009.01)
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CPC ***H04W 4/02*** (2013.01); ***B60R 22/48*** (2013.01); ***G01S 5/00*** (2013.01); ***G01S 5/0054*** (2013.01); ***G01S 5/0226*** (2013.01); ***G01S 5/12*** (2013.01); ***G08B 5/38*** (2013.01); ***H04W 4/006*** (2013.01); *H04W 64/00* (2013.01); *H04W 68/00* (2013.01); *H04W 84/18* (2013.01)

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USPC 340/7.1, 7.2, 331.2, 7.21, 825.49, 340/539.13, 539.1; 455/456.1, 41.2; 370/338

See application file for complete search history.

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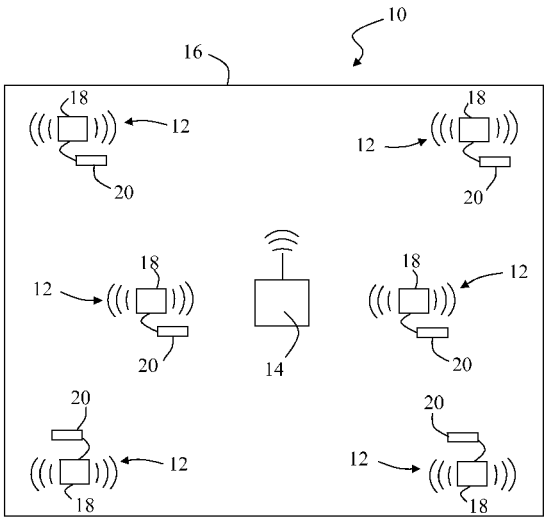
(57) **ABSTRACT**

A system and method for determining the location of wireless sensors are disclosed. The system may generally include a plurality of wireless sensor nodes communicatively coupled to a plurality of sensing devices. Additionally, the system may include a paging device configured to wirelessly transmit a page command to at least one of the wireless sensor nodes. Further, the paging device may receive a position indicator as a text string indicating a location of at least one of the plurality of wireless sensor nodes.

20 Claims, 3 Drawing Sheets



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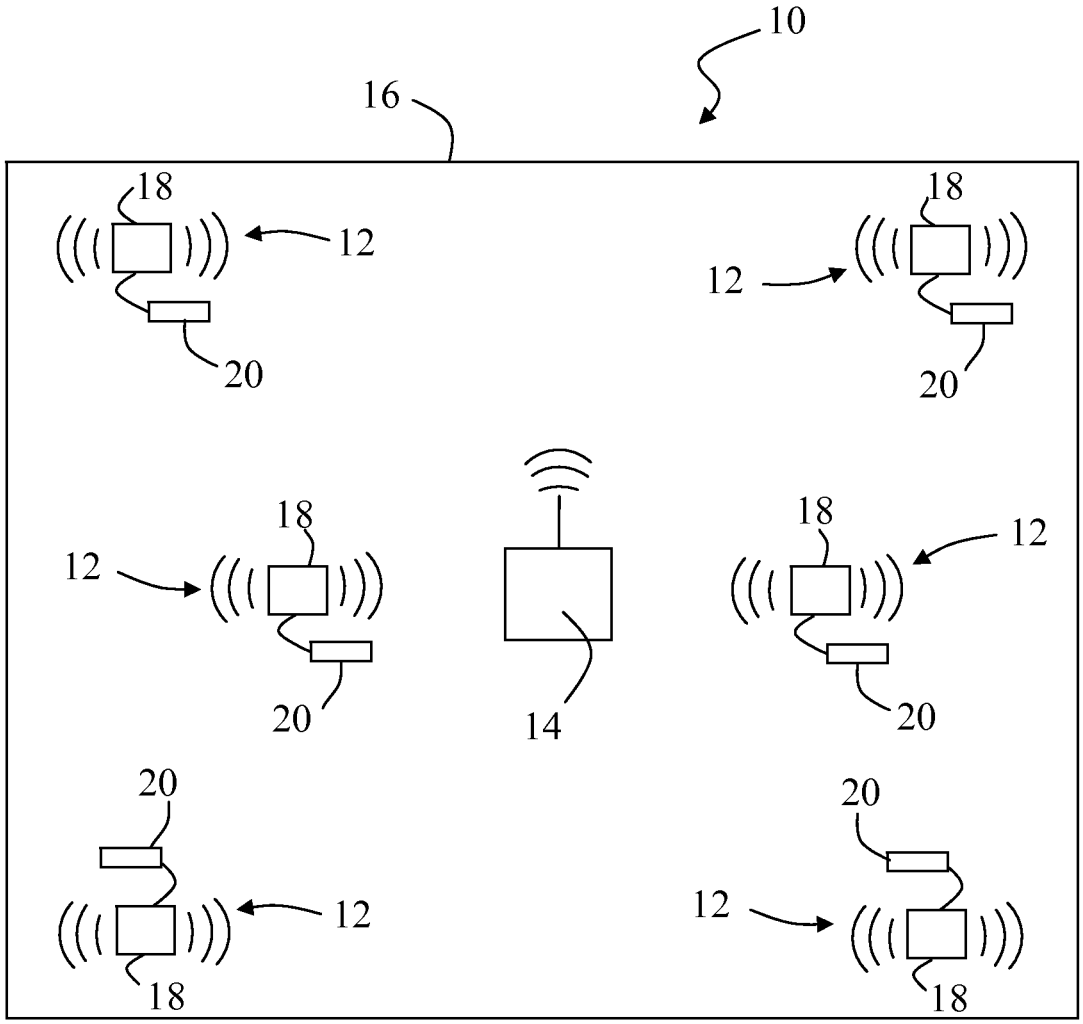

FIG. 1

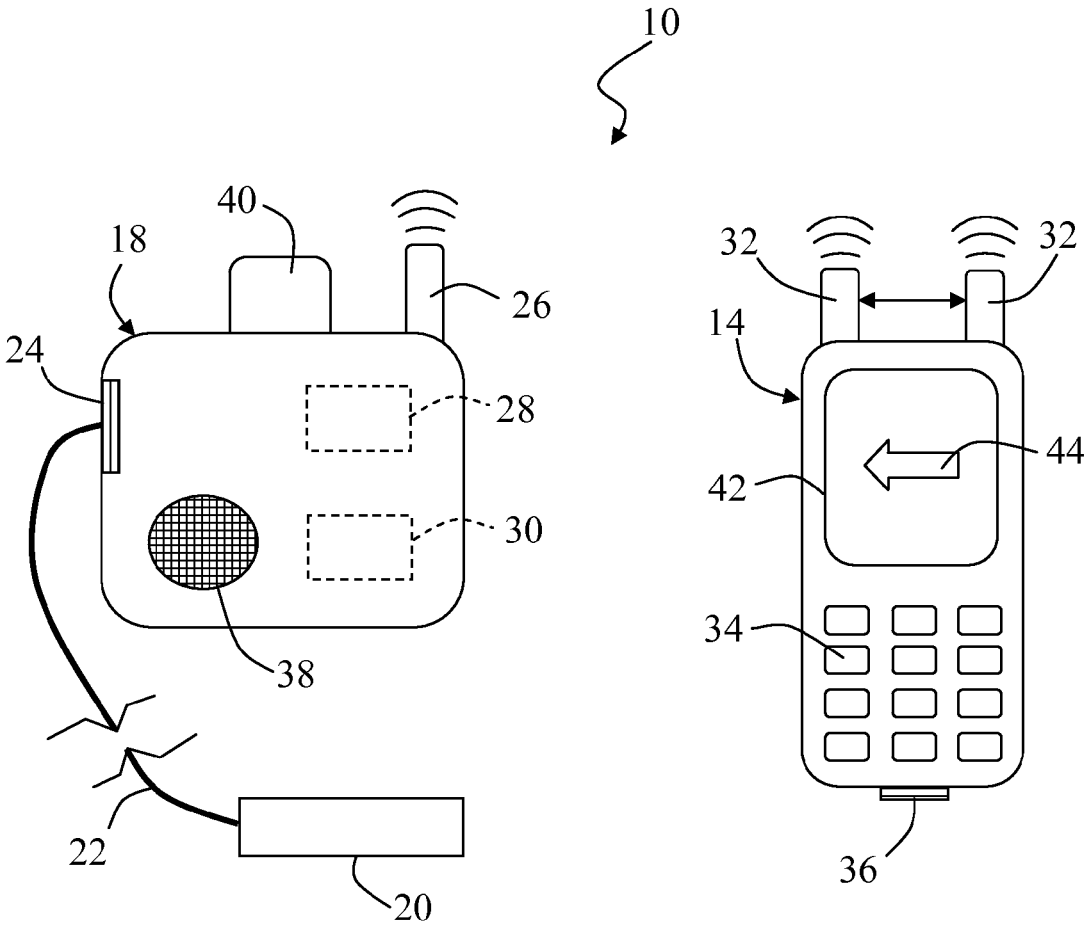

FIG. 2

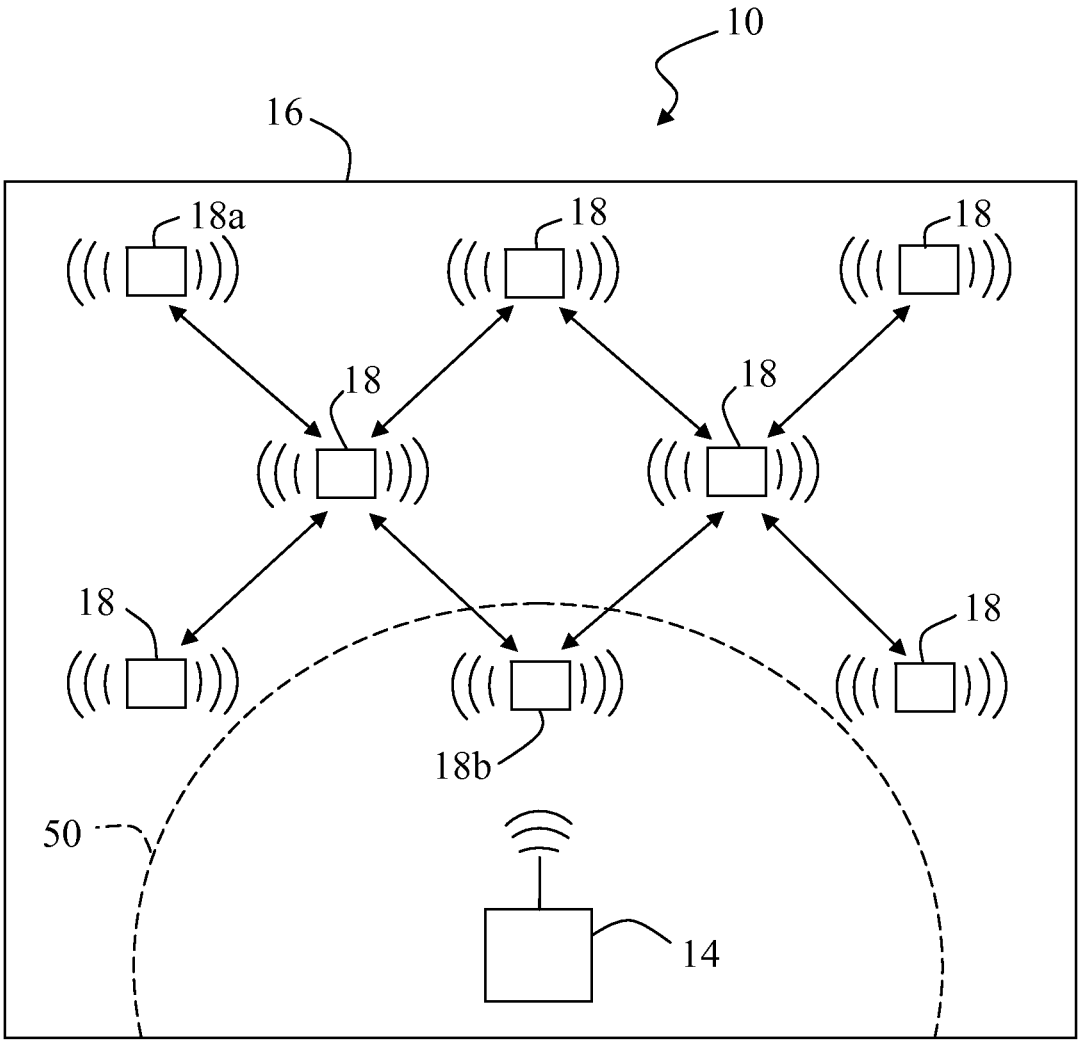

FIG. 3

SYSTEM AND METHOD FOR DETERMINING THE LOCATION OF WIRELESS SENSORS

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 12/887,806, entitled "System And Method For Determining The Location Of Wireless Sensors," filed Sep. 22, 2010, which is incorporated by reference in its entirety.

FIELD OF THE INVENTION

The present subject matter relates generally to wireless devices and, more particularly, to a system and method for locating wireless sensors.

BACKGROUND OF THE INVENTION

Devices, such as probes, sensors transducers, cameras and the like, are used across a wide range of industries to monitor the operating conditions of industrial assets. For example, an industrial facility may include any number of essential assets, such as various types of machinery, and a plurality of supporting assets, such as pumps, motors, blowers, heat exchangers, fans and similar assets, that impact the process flowing through the essential assets. Such essential and/or supporting assets are often communicatively coupled to a variety of different devices to measure and/or sense the vibration, temperature, pressure, relative position and other operating parameters of the assets to ensure their proper operation and to appropriately schedule maintenance work.

To decrease the costs of installing sensing devices throughout a large industrial facility, the devices are often configured as wireless sensors that permit data captured by the sensing devices to be wirelessly transmitted to a central server for subsequent analysis. However, once installed within an industrial facility, it is often the case that the exact location of each wireless sensor is forgotten, misplaced and/or difficult to obtain. This is particularly true with regard to very large industrial facilities that may include hundreds or even thousands of wireless sensors dispersed throughout the facility. As such, when one or more of the wireless sensors need to be serviced or otherwise located, a substantial amount of time and money can be wasted attempting to find each particular wireless sensor.

Accordingly, a system that provides for the efficient determination of the location of wireless sensors would be welcomed.

BRIEF DESCRIPTION OF THE INVENTION

Aspects and advantages of the invention will be set forth in part in the following description, or may be obvious from the description, or may be learned through practice of the invention.

In one aspect, the present subject matter discloses a system for determining the location of wireless sensors. The system may generally include a plurality of wireless sensor nodes, with at least one of the wireless sensor nodes being communicatively coupled to at least one of a plurality of sensing devices. Additionally, the system may include a paging device configured to wirelessly transmit a page command to at least one of the wireless sensor nodes. Further, the at least one wireless sensor node may be configured to produce a position indicator upon receipt of the page command.

In another aspect, the present subject matter discloses a system for determining the location of wireless sensors. The system may generally include a plurality of wireless sensor nodes forming at least part of a wireless mesh network. At least one of the wireless sensor nodes is communicatively coupled to at least one of a plurality of sensing devices. Additionally, the system may include a paging device configured to wirelessly transmit a page command across the mesh network to at least one of the wireless sensor nodes. Further, the at least one wireless sensor node may be configured to produce a position indicator upon receipt of the page command.

In a further aspect, the present subject matter discloses a method for determining the location of wireless sensors. The method may generally include generating a page command with a paging device, transmitting the page command to at least one of a plurality of wireless sensor nodes and producing a position indicator in response to the page command. The position indicator may generally provide an indication of the location of the at least one wireless sensor node.

These and other features, aspects and advantages of the present invention will become better understood with reference to the following description and appended claims. The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

A full and enabling disclosure of the present invention, including the best mode thereof, directed to one of ordinary skill in the art, is set forth in the specification, which makes reference to the appended figures, in which:

FIG. **1** provides a schematic depiction of one embodiment of a system for locating wireless sensors dispersed throughout an industrial environment in accordance with aspects of the present subject matter;

FIG. **2** provides front views of components of the system depicted in FIG. **1**, particularly illustrating an embodiment of a wireless sensor and a paging device in accordance with aspects of the present subject matter; and

FIG. **3** provides a schematic depiction of an embodiment of a system for locating wireless sensors forming part of a wireless mesh network in accordance with aspects of the present subject matter.

DETAILED DESCRIPTION OF THE INVENTION

Reference now will be made in detail to embodiments of the invention, one or more examples of which are illustrated in the drawings. Each example is provided by way of explanation of the invention, not limitation of the invention. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the scope or spirit of the invention. For instance, features illustrated or described as part of one embodiment can be used with another embodiment to yield a still further embodiment. Thus, it is intended that the present invention covers such modifications and variations as come within the scope of the appended claims and their equivalents.

The present subject matter generally provides a system for determining the location of wireless devices, such as wireless sensors. For example, in one embodiment, the system may be configured to locate wireless sensors dispersed throughout an industrial environment, such as within a large industrial facil-

ity or plant. Specifically, the system may include a paging device configured to wirelessly transmit a page command to one or more of the wireless sensors. In response to the page command, the wireless sensor(s) may be configured to transmit a position indicator, such as an audible tone, flashing light, triangulation signal or preprogrammed position signal, designed to facilitate the identification of the location of the sensors(s) within the industrial environment.

It should be appreciated that, although the present subject matter will be generally described with reference to a system for locating wireless sensors utilized in an industrial environment, the system and methods disclosed herein may be applied across a wide range of other devices and/or applications. For example, the system and methods of the present subject matter may be generally applicable to any wirelessly communicating device used in industrial applications, commercial applications, residential applications or any other suitable application and/or setting.

Referring to the drawings, FIG. **1** illustrates a schematic depiction of one embodiment of a system **10** for determining the location of a plurality of wireless sensors **12**. As shown, the system **10** generally includes a paging device **14** configured to wirelessly communicate with one or more of the plurality of wireless sensors **12**. In one embodiment, the wireless sensors **12** may be dispersed throughout an industrial environment, such as within a large industrial facility or plant **16**. Each wireless sensor **12** generally comprises a wireless sensor node **18** communicatively coupled to one or more sensing devices **20**. For example, in one embodiment, the sensing device(s) **20** may be communicatively coupled to each wireless sensor node through a suitable wire or communicative cable **22** (FIG. **2**) to permit data received by the sensing device **20** to be transmitted to its corresponding wireless sensor node **18**. Alternatively, the sensing devices **20** may wirelessly communicate with corresponding wireless sensor nodes **18** through any suitable wireless communications protocol.

As used herein, the term "sensing device" includes any device capable of monitoring, detecting, sensing, measuring and/or observing the operating conditions of an industrial asset, such as machinery, turbines, mechanical presses, compressors, pumps, motors, blowers, heat exchangers, fans and the like, or any other suitable asset in which information regarding its operating conditions is desired to be obtained. For example, sensing devices **20** may include probes mounted to or disposed within an asset which are configured to monitor, detect, sense, measure and/or observe the vibration, position, speed, timing, temperature, pressure and other operating conditions of the asset. Similarly, sensing devices **20** may also include various types of transducers (e.g., pressure and position transducers), transmitters (e.g., vibration and thrust transmitters) and cameras (e.g., time of flight and infrared cameras) configured to detect, sense, monitor, measure and/or observe the operating conditions of an asset. It should be readily apparent to those of ordinary skill in the art that various other types of sensing devices **20** may be included within scope of the present subject matter which are capable of monitoring, detecting, sensing and/or observing the operating conditions of an asset.

Referring to FIG. **2**, embodiments of a wireless sensor node **18** and a paging device **14** of the above described system **10** are illustrated in accordance with aspects of the present subject matter. Each wireless sensor node **18** for the wireless sensors **12** may generally be configured as a wireless sensor interface module. As such, the wireless sensor node **18** may include one or more data input ports **24** for receiving data from the sensing device(s) **20** and an antenna **26** for transmitting and receiving wireless signals. The data input ports **24** may generally comprise any suitable communicative port(s) that permit the transmission of data through any suitable communicative cable or wire **22**. For example, the input ports **24** may be configured to accept analogue inputs and/or digital inputs, including parallel and serial digital inputs, from the sensing device(s) **20**. The antenna **26** of each wireless sensor node may generally be configured to facilitate wireless communication between a gateway node or sever (not illustrated), another wireless sensor node **18**, a wirelessly transmitting sensing device **20** and/or the paging device **14**. For instance, the antenna **26** may permit data received from the sensing devices **20** to be wirelessly transmitted to the gateway node or server to enable communication of the data to any suitable databases and/or processing equipment. Thus, it should be appreciated that the antenna **26** may be configured to support one or more of a variety of different radio frequency (RF) or wireless communications protocols including, but not limited to, WI-FI (802.11 b/g), global positioning system (GPS) and ZIGBEE wireless communication protocols.

Each wireless sensor node **18** may also include one or more processor(s) **28** and associated memory element(s) **30** that configure the sensor node **18** to perform a variety of functions, such as data acquisition, signal conditioning and/or processing, data transmission and the like. It should appreciated that, as used herein, the term "processor" need not be limited to integrated circuits referred to in the art as being included in a computer, but broadly refers to a controller, a microcontroller, a microcomputer, a programmable logic controller (PLC), an application specific integrated circuit, and other programmable circuits. Additionally, it should be appreciated the memory element(s) **30** may comprise any suitable type of memory device(s) known in the art including, but not limited to, computer readable medium (e.g., random access memory (RAM), computer readable non-volatile medium (e.g., a flash memory), a floppy disk, a compact disc-read only memory (CD-ROM), a magneto-optical disk (MOD), a digital versatile disc (DVD) and/or other suitable memory device(s).

In one embodiment of the present subject matter, the memory element(s) **30** may be configured to temporarily or permanently store data received from the sensing device(s) **20**. Additionally, the memory element(s) **30** may be configured to store computer-readable and executable software instructions designed to be read and executed by processor(s) **28** to create output data (e.g., in the form of RF or wireless communication signals transmitted by the antenna) to permit the data received from the sensing device(s) **20** to be communicated to a suitable peripheral network device. Moreover, in a particular embodiment of the present subject matter, the memory element(s) **30** may also include suitable software instructions that, when implemented by the processors(s) **28** configure the wireless sensor node **18** to receive and process page commands transmitted from the paging device **14**. Such software instructions may also configure the wireless sensor node **18** to transmit a position indicator, such as an audible tone, flashing light, triangulation signal or preprogrammed position signal, upon receipt of the page command, as will be described in greater detail below.

Referring still to FIG. **2**, the paging device **14** of the present subject matter may generally be configured to transmit a wireless page command to one or more of the wireless sensor nodes. Thus, it should be appreciated the paging device **14** may generally comprise any device capable of communicating wirelessly with other devices via any suitable wireless communications protocol. For example, in a particular embodiment of the present subject matter, the paging device **14** may comprise any suitable WI-FI enabled device, such as

a variety of different smart phones, laptop computers, desktop computers, tablet computers, netbooks, mobile computing devices, personal digital assistants and the like. In other embodiments, the paging device **14** may comprise a wireless radio, radio transceiver, portable data collector, cellular or mobile phone, navigation device, or any other known wirelessly communicating device. Additionally, it should be appreciated that the paging device **14** may be configured as a stationary device or as a portable device (e.g., a hand-held device).

Similar to the wireless sensor nodes **18**, the paging device **14** may include one or more processor(s) and associated memory element(s) (not illustrated) which permit the storage and implementation of suitable software instructions configuring the paging device **14** to transmit page commands, via one or more antenna(s) **32**, to a single wireless sensor node **18** or a group of wireless sensor nodes **18**. The page command transmitted by the paging device **14** may generally comprise any wireless signal capable of being received, recognized, and/or processed by the wireless sensor node(s) **18** to which the command is directed. In one embodiment, each of the wireless sensor nodes **18** may be provided with or assigned a unique identifier number, such as a unique Media Access Control (MAC) address. Additionally, the paging device **14** may include input buttons (e.g., an alphanumeric keypad **34**), input ports **36** or the like which enable the unique identifier numbers to be inputted into the paging device **14**. As such, when it is desired that a particular wireless sensor node(s) **18** be located, the paging device **14** may be configured to transmit a page command embedded with the unique identifier numbers so as to cause only the sensor node(s) **18** having the inputted identifier number(s) to identify its location through the production of a position indicator.

As indicated above, upon receipt of a page command, a wireless sensor node **18** may be configured to produce a position indicator that facilitates the locating of its position within an industrial environment or any other setting in which it is disposed. In one embodiment, the wireless sensor node **18** may be configured to produce an audible alarm upon receipt of the page command transmitted by the paging device **14**. For example, as shown in FIG. **2**, the wireless sensor node **18** may include an audio device **38** disposed within, mounted onto and/or coupled to the sensor node **18**.

In general, the audio device **38** may comprise any suitable device capable of emitting an audible tone or sound. For example, in several embodiments, the audio device **38** may comprise one or more speakers, piezoelectric sound elements, sound transducers and the like. In alternative embodiments, the alarm produced by the audio device **38** may be a continuous sounding alarm or may be a ringing, pulsating and/or beeping alarm. Additionally, it should be appreciated that the alarm may generally be emitted at any suitable Decibel (dB) level that permits such alarm to be heard by the person(s) desiring to locate the wireless sensor node **18**. In embodiments in which the system **10** of the present subject matter is being utilized in a large industrial facility or plant **16**, it may be desirable for the audio device **38** to be capable of producing an audible alarm at a relatively high dB level to enable the alarm to be heard over any operating machinery and other industrial assets. For instance, the audio device **38** may be configured to emit a tone or sound at a dB level greater than about 70 dB, such as from about 70 dB to about 180 dB, or from about 95 dB to about 140 dB or from about 100 dB to about 120 dB and any other subranges therebetween.

In another embodiment of the present subject matter, the wireless sensor node **18** may be configured to produce visible light upon receipt of the page command transmitted by the paging device. For example, as shown in FIG. **2**, the wireless sensor node **18** may include a light source **40** disposed within, mounted onto and/or coupled to the sensor node **18**. In various embodiments, light source **40** may comprise one or more electroluminescent lamps, incandescent lamps, gas discharge lamps, high-intensity discharge lamps or any known light source capable of producing perceptible light. In a particular embodiment of the present subject matter, the light source **40** may comprise one or more light emitting diodes (LEDs) configured to emit a flashing, pulsating and/or blinking light.

In a further embodiment of the present subject matter, the wireless sensor node **18** may be configured to transmit a triangulation signal to the paging device **14** upon receipt of the page command. For example, in one embodiment, each wireless sensor node **18** may be configured to transmit a triangulation signal at a predetermined frequency. Thus, when a wireless sensor node **18** receives a page command from the paging device **14** and transmits a responding triangulation signal, the paging device **14** may be configured to recognize the triangulation signal as such based upon the signal frequency. The paging device **14** may then be configured to analyze the signal to determine the relative location and/or direction of the signal's source (i.e., the relative location and/or direction of the transmitting wireless sensor node **18**).

To facilitate the determination of the location and/or direction of a wireless sensor node **18** relative to the paging device **14**, the paging device **14** may be provided with software instructions that, when implemented, configure the paging device **14** to perform any suitable triangulation and/or localization method/calculation. For example, in the embodiment shown in FIG. **2**, the paging device **14** may include a pair of antennas **32** that permit the device **14** to determine the relative location and/or direction of a wireless sensor node **18** based upon the signal strength received by the antennas **32**. In particular, by comparing the strength of the triangulation signal transmitted by a wireless sensor node **18** and received by each antenna **32**, the paging device **14** may utilize known algorithms and/or equations to determine the direction and/or location of the wireless sensor node **18** relative to the direction at which the paging device **14** is oriented. Alternatively, the dual antenna configuration may permit the paging device **14** to determine the relative location and/or direction of a wireless sensor node based upon the time of flight of the signal. For example, the triangulation signal transmitted by a wireless sensor node **18** may include a time stamp indicating the exact time at which the signal was sent. Thus, by comparing the differences in the signal's time of flight between each antenna **32**, the paging device **14** may utilize known algorithms and/or equations to determine the direction and/or location of the wireless sensor node relative to the direction at which the paging device **14** is oriented.

Still referring to FIG. **2**, in embodiments in which the location of a wireless sensor node **18** is determined based upon triangulation and/or localization methods/calculations, the paging device **14** may also include a display screen **42** for providing a user of the device **14** a visual indication of the location and/or direction of the sensor node **18**. For example, the software instructions stored within the paging device **14** may configure the device **14** to display a visual indicator **44** of the direction of the wireless sensor node **18** desired to be located relative to the orientation of the paging device **14**. As shown, the visual indicator **44** may include an arrow or other positional marker that clearly indicates the relative direction of the wireless sensor node **18**. It should be appreciated that the display screen may include any suitable display known in the art, such as an organic light emitting display (OLED),

light-emitting diode (LED) display, electroluminescent display (ELD), plasma display panel (PDP) or liquid crystal display (LCD). It should also be appreciated that, in embodiments utilizing a triangulation and/or localization method/calculation, it may be particularly desirable for the paging device **14** to be configured as a hand-held or otherwise portable device to permit the device **14** to be transported and/or its orientation altered in response to the visual indicator **44** displayed on the display screen **42**.

In yet another embodiment of the present subject matter, the wireless sensor node **18** may be configured to transmit a preprogrammed position signal to the paging device **14** upon receipt of the page command. The preprogrammed position signal may generally comprise any signal that, when received and processed by the paging device **14**, identifies the precise or approximate location of the wireless sensor node **18** without requiring the use of a triangulation and/or localization method/calculation. In one embodiment, the preprogrammed position signal may comprise a preprogrammed text string input into the wireless sensor node, such as through one of its data input ports **24**, as the sensor node **18** is being initially installed within an industrial facility or plant **16** or other locale. The text string may generally correspond to a textual phrase relating to the position of the wireless sensor node **18**. For example, the text string may read "Location: third floor of Building C, on Machine #123XYZ." Thus, when the paging device **14** transmits a page command to the wireless sensor node **18**, the sensor node **18** may respond with the preprogrammed text string. Once received, the text string may be displayed on the display screen **42** of the paging device **14** to permit the location of the wireless sensor node **18** to be known by the user of the device **14**.

Referring now to FIG. **3**, in one embodiment, each of the wireless sensor nodes **18** of the disclosed system may form part of a wireless mesh network. Thus, as shown in FIG. **3**, each wireless sensor node **18** may be configured to both transmit and receive signals and/or commands to and from other sensors nodes **18** within its environment. Such a configuration may be particularly advantageous in scenarios in which the wireless sensor nodes **18** and/or the paging device **14** have a limited wireless transmission range. For instance, as shown, the transmission range **50** of the paging device **14** may be limited to a small portion of the industrial facility or plant **16** in which the wireless sensor nodes **18** are disposed. The wireless mesh network, thus, may permit the paging device **14** to transmit page commands to wireless sensor nodes **18** disposed beyond its transmission range. For example, in the illustrated embodiment, if a page command is desired to be transmitted to a particular wireless sensor node **18***a*, the command transmitted by the paging device **14** may be received by the wireless sensor node(s) **18***b* within its transmission range **50** and subsequently transmitted through the network to the desired sensor node **18***a*. Upon receipt of the page command by the desired sensor node **18***a*, the sensor node **18***a* may then produce any suitable position indicator to alert a user of the system to its position. Additionally, in embodiments in which the wireless sensor node **18** to be located is configured to transmit a triangulation signal and/or preprogrammed position signal upon receipt of the page command, the triangulation and/or position signal may similarly be sent through the wireless mesh network to ensure that the signal is transmitted to the paging device **14**.

It should be appreciated that the wireless sensor nodes **18** of the present subject matter may generally be configured to implement any suitable mesh network technology known in the art. For example, each of the wireless sensor nodes **18** may be provided with suitable software instructions that enable the sensor nodes **18** to perform dynamic routing, thereby permitting the sensor nodes **18** to automatically select the quickest and most efficient path to transmit information across the network from one location to another. Additionally, the mesh network may be designed to be self-forming, meaning that a newly added wireless sensor node **18** may be automatically detected and added to the network. Further, the wireless sensor nodes **18** may generally be configured to implement any suitable routing protocol known in the art for routing information across the network, such as the ZIGBEE protocol, the Ad-Hoc Configuration Protocol (AHCP) or the Dynamic WMN Configuration Protocol (DWCP).

This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they include structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

What is claimed is:

1. A system for locating a wireless sensor node, the system comprising:

a paging device configured to transmit a page command signal to the wireless sensor node;

at least one sensing device configured to monitor an operational parameter of an industrial asset; and

a wireless sensor communicatively coupled to the at least one sensing device, wherein the wireless sensor comprises a memory storing a preprogrammed position signal, wherein the wireless sensor is configured to receive the page command signal from the paging device and to transmit the preprogrammed position signal back to the paging device in response to the page command signal, wherein the preprogrammed position signal comprises a text string configured to indicate a location of the wireless sensor.

2. The system of claim **1**, wherein the paging device comprises a display configured to display a visual indicator to indicate a relative direction to the wireless sensor from the paging device.

3. The system of claim **1**, wherein the wireless sensor comprises an audio device configured to emit an audible alarm to enable determination of a relative location of the wireless sensor upon receipt of the page command signal.

4. The system of claim **1**, wherein the location indicates a machine on which the wireless sensor is connected.

5. The system of claim **1**, wherein the preprogrammed position signal enables a determination of the location without triangulation or localization calculations.

6. The system of claim **1**, wherein the memory is configured to store the text string from input into the wireless sensor when the wireless sensor is placed at the location.

7. The system of claim **1**, wherein the text string comprises an indication of the location including a building, a floor, or a machine.

8. The system of claim **1**, wherein the paging device comprises a display, wherein the display is configured to display the text string indicating the location of the wireless sensor.

9. A system for determining a location of wireless sensors, the system comprising:

a plurality of wireless sensor nodes, wherein at least one of the plurality of wireless sensor nodes is communica-

tively coupled to at least one of a plurality of sensing devices, and the sensing devices are configured to monitor at least one operating condition of an industrial asset; and

a paging device configured to wirelessly transmit a page command to at least one of the plurality of wireless sensor nodes, wherein the at least one of the plurality of wireless sensor nodes is configured to produce a position indicator upon receipt of the page command, the position indicator comprises a preprogrammed position signal, the at least one of the plurality of wireless sensor nodes is configured to transmit the preprogrammed position signal to the paging device upon receipt of the page command, and the preprogrammed position signal comprises a preprogrammed text string configured to indicate a location of the at least one of the plurality of wireless sensor nodes.

10. The system of claim **9**, wherein the paging device comprises a display configured to display a representation of the position indicator.

11. The system of claim **10**, wherein the representation of the position indicator comprises a visual representation of the preprogrammed text string.

12. The system of claim **9**, wherein the position indicator comprises a relative direction to the at least one of the plurality of wireless sensor nodes from the paging device.

13. The system of claim **12**, wherein the position indicator comprises a triangulation signal, and the paging device is configured to determine a relative location of the at least one of the plurality of wireless sensor nodes based upon the triangulation signal.

14. The system of claim **13**, wherein the paging device comprises a pair of antennas, the paging device is configured to determine the relative location of the at least one of the plurality of wireless sensor nodes by comparing at least one of a time of flight and a signal strength of the triangulation signal received by each of the antennas.

15. The system of claim **9**, wherein the position indicator comprises an audible alarm, wherein the at least one of the plurality of wireless sensor nodes comprises an audio device configured to emit the audible alarm upon receipt of the page command.

16. The system of claim **9**, wherein the position indicator comprises a visible light, wherein the at least one of the plurality of wireless sensor nodes including a light source configured to emit the visible light upon receipt of the page command.

17. A method for determining a location of a wireless sensor, the method comprising:

generating a page command using a paging device;

transmitting the page command to at least one of a plurality of wireless sensor nodes, wherein the at least one of the plurality of wireless sensor nodes is communicatively coupled to at least one of a plurality of sensing devices, and the sensing devices are configured to monitor at least one operating condition of an industrial asset;

receiving a preprogrammed text string indicating a location of the at least one of the plurality of wireless sensor nodes; and

displaying the location on a display of the paging device.

18. The method of claim **17**, comprising inputting a unique identifier number of the at least one of the plurality of wireless sensor nodes into the paging device.

19. The method of claim **17**, wherein generating the page command with the paging device comprises generating the page command including a unique identifier number of the at least one of the plurality of wireless sensor nodes, and the unique identifier number comprises a Media Access Control address.

20. The method of claim **17**, wherein the preprogrammed text string comprises an indication of a building, a floor, or a machine corresponding to the location of the at least one of the wireless sensor nodes.

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